Geophysical Research Abstracts
Vol. 16, EGU2014-13868, 2014
EGU General Assembly 2014

How within field abundance and spatial distribution patterns of earthworms and macropores depend on soil tillage

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Earthworms play a key role in soil systems. They are ecosystem engineers affecting soil structure as well as the transport and availability of water and solutes through their burrowing behaviour. There are three different ecological earthworm types with different burrowing behaviour that can result in varying local infiltration patterns: from rapid deep vertical infiltration to a stronger diffuse distribution of water and solutes in the upper soil layers.

The small scale variation in earthworm abundance is often very high and within fields earthworm population processes might result in an aggregated pattern. The question arises how the local distribution of earthworms affects spatial distributions of macroporosity and how both are influenced by soil tillage. Therefore we performed a total number of 430 earthworm samplings on four differently tilled agricultural fields in the Weiherbach catchment (South East Germany). Additionally, at a limited amount of 32 locations on two of the fields we performed sprinkling experiments with brilliant blue and excavated the soil to count macropores at different soil depths (10 cm, 30 cm and 50 cm) to compare macropore distributions to the earthworm distributions.